

Notice No. 4

Rules and Regulations for the Classification of Offshore Units, July 2014

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Issue date: June 2015

Amendments to	Effective date
Part 1, Chapter 2, Sections 2 & 3	1 July 2015
Part 1, Chapter 3, Sections 1, 2, 3, 4, 5, 6, 8, 9, 12, 18 & 21	1 July 2015
Part 1, Chapter 4, Sections 1, 3 & 4	Corrigenda
Part 1, Chapter 6 (New)	1 July 2015

Part 1, Chapter 2

Classification Regulations

Effective date 1 July 2015

■ Section 2

Definitions, character of classification and class notations

2.3 Character symbols

(Part only shown)

2.3.2 A full list of character symbols for which offshore units may be eligible is as follows:

✱ This distinguishing mark, will be assigned to units built under supervision of another IACS member society and later assigned class with LR. For such units the class notations will be reviewed separately and equivalent notations will be assigned.

2.3.4 Self-propelled units which are required by the Owners to make transit voyages from one operating location to another or are disconnectable to avoid severe storms or hazards are to comply with the requirements of 2.3.2 for the assignment of the character figure (1) which will be assigned after the character letter T. The disconnection or reconnection of a disconnectable unit is to be to the satisfaction of the Surveyor. For disconnections to avoid severe storms or hazards see 3.8.2.

2.4 Class notations (hull/structure)

2.4.12 The assigned character symbols of class and the appropriate class notations will be entered in the ~~ClassDirect Live~~ Class Direct website. For all unit types except ship units and other surface type units, the limiting structural design criteria on which classification is based will also be entered on the ~~ClassDirect Live~~ Class Direct website.

All instances of ClassDirect Live have been amended to Class Direct throughout this Part.

All instances of Class Direct Live have been amended to Class Direct throughout this Part.

All instances of CD Live have been amended to Class Direct throughout this Part.

2.4.14 The application of the **OIWS** notation may be assigned to existing units ~~will be subject to special consideration by the Classification Committee~~ on satisfactory completion of the Survey, provided that the applicable requirements of LR's Rules and Regulations are complied with.

2.5 Class notations (machinery)

(Part only shown)

2.5.1 The following class notations are associated with machinery construction and arrangements, and may be assigned as considered appropriate by the Classification Committee:

✱ **Lloyd's RGP** This notation will be assigned when a regasification system and arrangements have been constructed, installed and tested under Lloyd's Register's (hereinafter referred to as LR's) Special Survey and in accordance with the relevant requirements of the Rules.

✱ **Lloyd's RGP+** This notation will be assigned when a regasification system and arrangements have been constructed, installed and tested under LR's Special Survey and in accordance with the relevant requirements of the Rules and the system is configured to allow continuing operation in the event of a single failure.

2.6 Lifting Appliances

2.6.1 See Pt 3, Ch 11, Table 11.1.1.

2.7 Class notations (environmental protection)

2.7.2 ~~The class notations defined in 2.6.1 will be suspended on change of Owner or Manager until LR can confirm by audit that the necessary operational procedures required by the Rules for Ships are established.~~

2.9 Descriptive Notes/Supplementary Character

2.9.2 When a notation is assigned in accordance with ~~2.7~~ 2.8, a descriptive note supplementary character will also be added ~~on LR's ClassDirect Live website~~ to indicate the applicable National Administration, e.g., Norwegian Verification (**N**), United Kingdom Verification (**UK**).

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■ Section 3 Surveys – General

3.2 New construction surveys

3.2.1 When it is intended to build a unit for classification with LR, constructional plans and all necessary particulars relevant to the hull/structure, equipment and machinery, as detailed in the Rules, are to be submitted for the approval of LR before the work is commenced. Any subsequent modifications or additions to the scantlings, arrangements or equipment shown on the approved plans are also to be documented and submitted for approval.

3.2.7 Copies of approved plans (showing the unit as built), essential certificates and records, the Operations Manual and loading and other instruction manuals are to be readily available for use when required by the attending Surveyors, ~~and may be required to be kept on board.~~

3.5 Existing installation – Periodical Surveys

3.5.10 Special Surveys which are commenced prior to their due date are not to extend over a period greater than 15 months, if such work is to be credited towards the Special Survey. Where the Special Survey is completed more than three months before the due date, the new record of Special Survey will be the final date of survey. In all other cases, the date recorded will be the fifth anniversary.

In cases where the unit has been laid up or has been out of service because of a major repair or modification and the Owner elects to only carry out the overdue surveys, the existing Special Survey date will be maintained. If the Owner elects to carry out the next due Special Survey, the new record of the Special Survey will be the final date of survey.

3.5.27 Where the Committee has agreed to an Owner's request to assign the notation 'laid-up', the unit may be retained in class provided a satisfactory general examination of the hull and machinery is carried out at the Annual Survey due date and an Underwater Examination (UWE) is carried out at the Special Survey due date. The general examination may be carried out within three months before or after the Annual Survey due date. In order to reactivate a unit from lay up and return it into service, the Owner must make an application to the Classification Committee. They will consider the application and decide on the extent of surveys to be carried out, based on surveys overdue and the duration of lay up.

3.6 Surveys for novel/complex systems

3.6.1 Where novel/complex machinery and equipment have been accepted by LR and for which existing survey requirements are not considered to be suitable and sufficient then appropriate survey requirements are to be derived as part of the design approval process. In deriving these requirements LR will consider, but not be limited to, the following:

- (a) Plan appraisal submissions;
- (b) Risk based analysis documentation where required by the Rules;
- (c) Equipment manufacturer recommendations;
- (d) Relevant recognised national or international standards.

Existing sub-Sections 3.6 to 3.8 have been renumbered 3.7 to 3.9.

3.9 3.10 Withdrawal/suspension of class

3.10.10 When a unit is intended for a demolition voyage with any Periodical Survey overdue, the unit's class suspension may be held in abeyance and consideration may be given to allow the unit to proceed on a single direct ballast voyage from the lay up or final discharge port to the demolition yard, provided the attending Surveyor finds the unit in a satisfactory condition to proceed for the intended voyage, at the discretion of the Classification Committee.

3.10.11 When a unit is intended for a single voyage from 'laid-up' position to repair yard with any Periodical Survey overdue, the unit's class suspension may be held in abeyance and consideration may be given to allow the unit to proceed on a single direct ballast voyage from the site of lay up to the repair yard, upon agreement with the Flag Administration, at the discretion of the Classification Committee. This is provided the unit is found in a satisfactory condition by surveys, the extent of which are to be based on surveys overdue and duration of lay-up.

Existing paragraph 3.9.10 has been renumbered 3.10.12.

3.11 Force Majeure

3.11.1 If due to circumstances reasonably beyond the Owner's or LR's control (limited to such cases as damage to the offshore unit or structure, unforeseen inability of LR to attend the offshore unit due to the governmental restrictions on right of access or movement of personnel, unforeseeable delays in port due to unusually lengthy periods of severe weather, strikes, civil strife, acts of war, or other cases of force majeure) the unit is not in a port where the overdue surveys can be completed at the expiry of the periods allowed, the Classification Committee may allow the unit to sail, in class, directly to an agreed facility and, if necessary, then, in ballast, to an agreed facility at which the survey will be completed, provided that LR:

- (i) Examines the unit's records; and
- (ii) Carries out the due and/or overdue surveys and examination of recommendations at the first port of call when there is an unforeseen inability of LR to attend the unit in the present port, and

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(iii) Has satisfied itself that the unit is in a condition to sail for one trip to a facility and subsequent ballast voyage to a repair facility if necessary. (Where there is unforeseen inability of LR to attend the unit or structure in the present port, the master is to confirm that the unit is in condition to sail to the nearest port of call.)

Existing sub-Sections 3.10 to 3.12 have been renumbered 3.12 to 3.14.

~~3.13~~ 3.15 Life extension

~~3.13.1~~ 3.15.1 The Classification Committee may permit a A unit to may remain in Class after the end of the design life of the unit, provided a life extension programme is completed satisfactorily approved and the appropriate surveys completed to the satisfaction of LR.

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Periodical Survey Regulations

Effective date 1 July 2015

■ Section 1 General

1.5 Definitions

1.5.15 A **natural gas fuel installation** comprises the following; fuel bunkering, fuel storage, fuel processing and fuel delivery to gas fuelled consumers. The scope of the natural gas fuel installation extends from the bunker manifold to the natural gas fuelled consumer and includes any re-liquefaction plant and compressors that are fitted to manage boil off.

1.7 Preparation for survey and means of access

1.7.7 For **natural gas fuel installations** see also Section 21.1.

■ Section 2 Annual Surveys – Hull and Machinery requirements

2.1 General

~~3.2.3~~ 2.1.4 For salt-water ballast tanks, other than independent double bottom tanks, where a protective coating is found to be in POOR condition, as defined in 1.5, and it has not been repaired, where a soft or semi-hard coating has been applied or where a protective coating was not applied from the time of construction, maintenance of class will be subject to the spaces in question being internally examined and gauged as necessary at Annual Surveys.

~~3.2.4~~ 2.1.5 For independent salt-water double bottom tanks where a protective coating is found to be in POOR condition, as defined in 1.5, and it has not been repaired, where a soft or semi-hard coating has been applied or where a protective coating was not applied from the time of construction, maintenance of class may, at the discretion of the Classification Committee, be subject to the spaces in question being examined and gauged as necessary at Annual Surveys.

Existing paragraphs 3.2.5 to 3.2.12 have been renumbered 3.2.3 to 3.2.10.

2.1.6 For **natural gas fuel installations** see also Sections 21.2 to 21.6.

■ Section 3 Intermediate Surveys – Hull and Machinery Surveys

3.2 Intermediate Surveys

3.2.11 For **natural gas fuel installations** see also Section 21.7.

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Section 4

Docking Surveys and In-water Surveys – Hull and machinery requirements

4.2 Docking Surveys

4.2.3 For self-elevating units, at each Docking Survey or equivalent In-Water Survey coinciding with Special Survey, the Surveyor is to be satisfied with the internal condition of the leg footings or mats. Leg connections to leg pads are to be non-destructively tested. Non destructive testing may be required of areas considered to be critical or found to be suspect by the Surveyor. Non-metallic expansion pieces in the main seawater cooling and circulating systems are to be examined both externally and internally.

4.3 In-Water Surveys

4.3.1 ~~When it is not practicable to dry-dock a unit or when an Owner does not intend to dry-dock a unit during its normal service life the~~ The Classification Committee will accept an In-Water Survey in lieu of the intermediate docking survey between Special Surveys on units other than those where an **OIWS** notation is assigned, see Ch 2.2.4.13 where suitable protection is applied to the underwater portion of the hull and provided the information in paragraphs 4.3.2. and 4.3.3 are complied with.

4.3.7 The In-water Survey is to be carried out at an agreed geographical location, with the Surveyor to LR satisfied that the unit at a suitable draught and the conditions satisfactory for diver or ROV inspection. The in-water visibility is to be good and the hull below the waterline is to be clean. The Surveyor is to be satisfied that the method of pictorial presentation is satisfactory. There is to be good two-way communication between the Surveyor and the diver/ROV operator. The Survey is to be witnessed by the Surveyor. This requires the Surveyor to be on board while the Survey is carried out, to the extent necessary to control the process. The Surveyor may extend the scope of Survey if deemed necessary.

Section 5

Special Survey – Hull requirements

5.1 General

5.1.6 ~~During the Docking Survey, or an In-water Survey in lieu of a Docking Survey, for installations with crude oil bulk storage tanks, the overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo spaces and ballast tanks are to be carried out as required, if not already surveyed.~~

Existing paragraph 5.1.7 has been renumbered 5.1.6.

5.3 Examination and testing

5.3.14 In addition to the requirements of 5.3.1, ~~self-elevating~~ self-elevating units are to have a complete survey of all legs, footings and mats. Particular attention is to be given to the leg structure in way of the waterline. Tubular or similar type legs are to be examined externally and internally, including stiffeners and pin holes. All critical regions defined in 2.2.4 are to be examined by approved methods of NDE, including the leg connections to footings or mats, see also Ch 2.3.5.12. Jetting piping systems or other external piping, particularly where penetrating footings or mats, are to be examined. Where the spud cans or mat are partly or entirely obscured below the mud line where the Special Survey is otherwise being completed, consideration may be given to postponement of the examinations until the next Rig move.

Section 6

Machinery Surveys – General Requirements

6.2 Complete Surveys

6.2.14 For natural gas fuel installations see also Sections 21.7 and 21.8.

Section 8

Oil Reciprocating internal combustion engines – Detailed requirements

Scope

The requirements of this Section are applicable to reciprocating internal combustion engines, operating on liquid, gas or dual fuel, providing power for services essential to the safety of the unit.

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Section 9

Electrical equipment

9.3 Docking Surveys and In-water Surveys

~~9.3.1~~ 9.2.14 For production and oil storage units five years old and over, 9.2.11 is to be complied with. In addition, an electrical insulation resistance test of the circuits terminating in, or passing through, the dangerous areas is to be carried out.

Section 12

Screwshafts, tube shafts and propellers

12.4 Screwshaft Condition Monitoring (SCM)

~~12.4.1~~ Where oil lubricated shafts with approved oil glands are fitted, and the Owner has complied with the following requirements, the ShipRight descriptive note **SCM** (Screwshaft Condition Monitoring) may be entered on the ClassDirect Live website:

12.4.1 Monitoring records are to be reviewed at annual survey for all units assigned the ShipRight descriptive note SCM (Screwshaft Condition Monitoring). The records that are to be maintained for oil and water lubricated bearings are detailed in the following sections.

12.4.2 Oil lubricated bearing records are to be available on board that include the following:

- (a) Lubricating oil analysis to be carried out regularly at intervals not exceeding six months. ~~The lubricating oil analysis documentation is to be available on board.~~ Each analysis is to include the following minimum parameters:
 - (i) Water content
 - (ii) Chloride content
 - (iii) Bearing material and metal particles content.
 - (iv) Oil ageing (resistance to oxidation).

~~(b) Note:~~ Oil samples are to be taken under service conditions and are to be representative of the oil within the sterntube.

~~(c) (b) Oil consumption is to be recorded.~~

~~(d) (c) Bearing temperatures are to be recorded (two temperature sensors or other approved arrangements are to be provided).~~

~~(e) Facilities are to be provided for measurement of bearing wear down.~~

~~(f) Oil glands are to be capable of being replaced without withdrawal of the screwshaft.~~

12.4.3 Water lubricated bearing records are to be available on board that include the following:

- (a) A record of variations in the flow rate of lubricating water.
- (b) A record of variation in the shaft power transmission.
- (c) Wear monitoring records for the sternbush.
- (d) For open loop systems the records from equipment for continuous monitoring of water sediment or turbidity are to be provided if requested by the attending surveyor, alternatively if a LR approved extractive sampling and testing procedure is used then the applicable records are to be made available if requested. Records of cleaning and replacement of lubrication filters/separators are to be maintained on board. The pumping and water filtration system is to be considered part of the continuous survey cycle and is to be subject to a Periodical Survey.
- (e) Where a closed cycle water system is used, the pumping and water filtration systems are to be considered part of the continuous survey cycle and are to be subject to a Periodical Survey. Water analysis is to be carried out regularly at intervals not exceeding six months. Samples are to be taken under service conditions and are to be representative of the water circulating within the sterntube. Analysis results are to be retained on board and made available to LR on request. The analysis is to include the following parameters:
 - (i) Chloride content
 - (ii) Bearing material and metal particles content.

~~12.4.2~~ 12.4.4 For maintenance of the descriptive note **SCM**, the records of analyses, consumption and temperatures, together with wear down readings, all data collected in 12.4.2 and 12.4.3 are to be retained on board and audited by LR annually.

12.4.3 12.4.5 Where the requirements for the descriptive note **SCM** have been complied with, the screwshaft need not be withdrawn at surveys as required by 12.3.2, provided all condition monitoring data is found to be within permissible limits and all exposed areas of the shaft are examined by a magnetic particle crack detection method or an alternative approved means for shafts with a protective liner or coating (see Pt 5, Ch 6, 4.1.3(f) of the *Rules and Regulations for the Classification of Ships*). The remaining requirements of 12.3.2 are to be complied with. Where the Attending Surveyor considers that the data presented is not entirely to his satisfaction sufficient to determine the condition of the shaft, the shaft ~~will~~ may be required to be withdrawn in accordance with 12.3.2. For water lubricated bearings, the screwshaft is to be withdrawn for examination, as 12.3.1, when the unit reaches 18 years from the date of build or the third Special Survey, whichever comes first.

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■ Section 18 Inert gas systems

18.2 Scope of surveys

18.2.4 See 21.3.5 and 21.8.12 for inert gas systems on units with natural gas fuel installations.

■ Section 21 Natural Gas Fuel Installations

21.1 General

21.1.1 The requirements of Part 1, Chapter 3, Section 6 Machinery surveys – *General requirements* are to be complied with, as applicable.

21.1.2 In addition to the survey requirements below, further survey requirements may be imposed; as identified during the risk assessment process, see Pt 1, Ch 2,3.6.

21.1.3 This Section provides requirements for the survey of natural gas fuel installations as defined in 1.5.15 (natural gas is hereinafter referred to as fuel).

21.1.4 The fuel installation is to be surveyed in working condition except at Special Survey where internal examination of some components will be required. See 21.8 and 21.9.

21.1.5 Annual Survey should be scheduled, if possible, to coincide with a bunkering operation to allow for verification of fuel storage tank level alarms and bunkering control, alert and safety systems under operational conditions. At annual survey physical testing of alarms and shutdowns is not required unless it is considered necessary by the attending surveyor. In any case records of the alarms are to be retained for the verification of the attending Surveyor.

21.1.6 The Intermediate Survey supplements the Annual Survey by testing the fuel bunkering system including automatic control, alert and safety systems to confirm satisfactory operation. The extent of the testing required for the Intermediate Survey may briefly interrupt the fuel installation and therefore unit operations and the survey are to be scheduled accordingly.

21.1.7 The extent of the testing required for Complete Surveys will normally be such that the full survey cannot be carried out with the fuel installation operating or loaded with fuel. Consequently, aspects of the survey should be coordinated to correspond with drydocking or another period when the system will be gas free. Completion of the survey requires verification of satisfactory condition of the installation at the normal operating temperatures and pressures so will normally be completed once the unit has been bunkered following reactivation of the system.

21.1.8 Prior to any internal inspection of fuel storage tanks, associated piping, fittings and equipment, etc., the respective items are to be made safe for access by means of isolating relevant valves, purging and gas-freeing the space.

21.1.9 Where an approved condition-monitoring system is employed for the fuel system and its constituent components, and the applicable Descriptive Note is assigned, the requirements of these regulations for opening up and internal examination may be waived where the condition of the equipment can be shown to be within agreed acceptable limits as detailed in Pt 5, Ch 21 of the *Rules and Regulations for the Classification of Ships*.

21.1.10 The following documentation, as applicable, is to be available on board the unit:

- (a) Relevant instruction and information such as loading limit curve information, bunkering procedures, cooling down procedures and fuel installation test and inspection procedures.
- (b) Condition-Monitoring or Condition-Based Maintenance documentation as applicable.
- (c) Test records for bunkering ESD systems.
- (d) Records of crew tests/inspections of the fuel installation.

21.1.11 For Special Survey requirements for electrical equipment see Section 9.

21.2 Survey Following Repair

21.2.1 Following repair, independent fuel storage tanks of Type C are to be hydrostatically tested in accordance with the manufacturer's test and inspection instructions (normally at 1.25 times the approved maximum vapour pressure). Other types of fuel storage tank, such as membrane tanks, are to be tested in accordance with approved procedures provided by the fuel storage tank designers. After testing, suitable drying and consequent air-purging procedures are to be followed to return the tank to operational condition.

21.3 Annual Surveys – General Requirements for Fuel Systems

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21.3.1 The Annual Survey is to be carried out with the fuel installation operational. Gas-freeing will not generally be necessary.

21.3.2 The unit's log and operational records for the fuel installation, covering the period from the previous survey, are to be examined. Any malfunction of the installation recorded in the log is to be investigated. It is to be verified that any repairs have been carried out to an acceptable standard and in accordance with the applicable Rules and Regulations.

21.3.3 Control, alert and safety systems are to be surveyed as follows:

- (a) The control, alert and safety systems for the fuel storage tanks and processing system are to be verified in satisfactory condition by one or more of the following methods:
 - (i) Comparison of read-outs from local and remote indicators.
 - (ii) Consideration of read-outs with regard to the actual conditions.
 - (iii) Examination of maintenance records with reference to the approved maintenance management system.
 - (iv) Verification of calibration status of the measuring instruments.
- (b) All control, alerts and safety systems are to be tested, where testing is not possible due to operational reasons simulated testing may be accepted by the attending Surveyor. Which are to include but are not limited to:
 - (i) fuel storage tank and processing system high and low pressure
 - (ii) fuel storage tank high and high-high level
 - (iii) fuel storage tank overfill level
 - (iv) fuel storage tank high temperature.
- (c) Fuel leakage detection systems (temperature sensors and gas detection as applicable) are to be examined and tested in accordance with the manufacturer's instructions and calibrated using sample gas.
- (d) The electrical installation, equipment and cables in areas which may contain flammable gas are to be examined in order to verify that they are in good condition and have been properly maintained. Bonding straps that are installed to control static electricity are to be visually examined.
- (e) Alerts and safety systems associated with pressurised installations and any safety device associated with non-safe type electrical equipment that is protected by air-locks or pressurisation, are to be verified.

21.3.4 Fuel installations are to be surveyed as follows:

- (a) Portable and/or fixed drip trays, or insulation providing protection in the event of fuel leakage, are to be examined.
- (b) Components of the fuel installation fitted with insulation to provide protection against ice formation on are to be examined for satisfactory condition.
- (c) Fuel piping, valves and fittings are to be generally examined, with particular attention to double-wall or ventilated ducting arrangements, expansion bellows, supports and vapour seals on insulated piping.

21.3.5 Inerting arrangements and associated alarms are to be verified as being in satisfactory condition, including the means for prevention of backflow of fuel vapour to the inert gas system.

21.3.6 Ventilation systems are to be surveyed as follows:

- (a) Ventilation systems and air-locks including their alarm system are to be generally examined.
- (b) Ventilation fans in hazardous areas are to be visually examined.
- (c) For ventilated double-walled piping or ducting containing fuel piping within machinery spaces, exhaust fans and/or supply fans are to be examined to ensure that the air-flow is not impeded.
- (d) Fuel piping and components associated with the fuel processing equipment are to be visually examined.

21.3.7 The closing devices for all air-intakes and openings into accommodation spaces, service spaces, machinery spaces, control stations and approved openings in superstructures and deckhouses less than 10m from deck-mounted fuel storage tanks, are to be examined.

21.3.8 Venting arrangements, including protection screens if provided, for fuel storage tanks, inter-barrier spaces and tank hold spaces as applicable, are to be visually examined externally. The external condition of the fuel storage tank relief valves is to be verified and records of the last test of the opening/closing pressures are to be reviewed.

21.3.9 Means for draining the vent arrangements from fuel storage tank pressure relief valves and other system relief valves are to be examined to ensure that there is no liquid build-up that would impede effective operation, drain valves are to be checked as applicable.

21.3.10 Heating arrangements, if fitted, for steel structures in cofferdams and other spaces are to be verified in satisfactory condition.

21.3.11 All gas-tight bulkhead penetrations, including any gas-tight shaft seals, are to be visually examined.

21.4 Annual Surveys – Fuel Processing Equipment

21.4.1 The following fuel processing equipment is to be generally examined in working condition and operational parameters verified. Insulation, where fitted, need not be removed but any deterioration of insulation, or evidence of dampness which could lead to external corrosion of the vessels or their connections, is to be investigated:

- (a) Heat exchangers and pressure vessels.
- (b) Natural gas fuel heaters, vaporisers, masthead heaters.
- (c) Heating arrangements, including provision for continuous heating and circulation of heating medium to prevent freezing during start up and when the fuel installation is not in use.

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(d) Fuel piping and components associated with the fuel processing equipment.

21.4.2 Where the double wall or duct containing fuel piping is protected using a pressurised inert gas atmosphere the monitoring and maintenance of the inert atmosphere is to be confirmed in satisfactory condition.

21.4.3 The condition of the fuel isolation valve and double block and bleed arrangements for each consumer is to be examined with respect to:

- (a) Containment to prevent fuel leakage from any valve arrangements installed within the machinery space.
- (b) Connections to the inerting and venting arrangements.
- (c) General examination to confirm that the valve arrangement and all associated fuel monitoring and control equipment are in satisfactory condition. The external examination is to be supplemented by a review of relevant operational, maintenance and service reports.

21.4.4 Where fuel processing equipment is located within an independent space that functions as containment in the event of a fuel spill (e.g. a tank connection space), the space is to be examined internally and externally to verify that the structure remains in a satisfactory condition to contain any potential leakage of fuel including any thermal isolation to protect surrounding structure from damage due to cryogenic leakage.

21.5 Annual Surveys – Fuel Storage

21.5.1 Areas in which fuel storage tanks are located (on and below deck) are to be examined for any changes to the arrangements within those areas that may affect the hazardous area rating.

21.5.2 For Type C pressurised fuel storage tanks the external surface of the fuel storage tank insulation is to be visually examined for cold spots to verify the condition of the insulation arrangements. This examination is to be carried out with the fuel storage tanks loaded. Ideally fuel storage tanks should be loaded to the maximum loading limit; examination of partially-filled fuel storage tanks may be accepted alongside a review of records of periodic cold spot examinations carried out by suitably trained and qualified crew.

21.5.3 The supporting structure is to be examined to confirm that the saddle arrangement remains in satisfactory condition in accordance with the approved design.

21.5.4 For vacuum-insulated fuel storage tanks, monitoring records are to be reviewed to confirm satisfactory maintenance of the vacuum. Any trends identifying a breakdown or loss of vacuum containment are to be investigated.

21.5.5 For Type B fuel storage tanks where the insulation arrangements are such that the insulation cannot be examined, the surrounding structures of wing tanks, double bottom tanks and cofferdams are to be visually examined for cold spots. This examination is to be carried out with the fuel storage tanks loaded. Ideally fuel storage tanks should be loaded to the maximum loading limit; examination of partially-filled fuel storage tanks may be accepted alongside a review of records of periodic cold spot examinations carried out by suitable trained and qualified crew.

21.5.6 For membrane fuel storage tanks the performance of the insulation arrangements is to be confirmed in accordance with approved procedures submitted by the containment designers.

21.6 Annual Survey - Fuel Bunkering System

21.6.1 The fuel-bunkering system, including manifold connections, isolation valves, bunker piping and linked Emergency Shut Down (ESD) system connection equipment (including cabling and connectors), are to be visually examined.

21.6.2 Bunkering operations are to be observed as far as possible; satisfactory condition of the bunkering control alert and safety system is to be verified. During annual survey it is not expected that ESD1 (stoppage of bunker transfer) or ESD2 (disconnection of bunker piping) will be operationally tested but records of maintenance and testing are to be reviewed. However, prior to starting the bunkering operation, it is expected that an ESD1 is tested with no LNG in the system (i.e. a dry test). Records of the testing are to be available during survey.

21.7 Intermediate Surveys

21.7.1 In addition to the requirements below, the requirements of 21.1 to 21.6 are to be complied with.

- (a) Control, alert and safety systems for the bunkering system, fuel-containment systems and processing equipment, together with any associated shutdown and/or interlock, are to be tested under working conditions and, if necessary, recalibrated. Shutdown sequence and extent are to be verified against documented procedures where applicable. Such safety systems include but are not limited to:
 - (i) Bunkering ESD system is to be tested, without fuel in the piping, to verify that ESD system operation will result in a closure of the isolation valves and a shutdown of machinery associated with bunkering operations. All ESD activations and outputs are to be tested including fuel storage tank overfill protection, bunkering isolation valve closure and automatic shutdown of machinery associated with bunkering operations.
 - (ii) Fuel-processing equipment shutdown and closure of isolation valves resulting from:
 - loss of the valve-actuating medium;
 - loss of ventilation in fuel piping double wall /ventilated duct; or
 - loss of pressure of inert gas in pressurised double-walled pipe arrangement.

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- (iii) Fuel processing equipment shutdown and closure of isolation valves as a result of deviation in the fuel supply to engine-room from the normal operating conditions (temperature and pressure).
- (iv) Fuel installation shutdown as a result of gas detection.
- (v) Safety interlocks on fuel-processing equipment are to be examined and tested as necessary to confirm satisfactory condition.
- (b) A General Examination within the areas deemed as hazardous, such as bunker stations, vent mast area, tank connection space and spaces adjacent to vent arrangements from the tank connection space (if applicable), to verify the electrical arrangements have been maintained satisfactorily for operation in a hazardous environment.
- (c) Verification that piping and independent fuel storage tanks are electrically bonded to the hull.

21.7.2 Consideration will be given to simulated testing, provided that it is considered representative. Comprehensive maintenance records, including details of tests carried out in accordance with the fuel plant and instrumentation maintenance manuals may be presented for review. Acceptance of either simulated testing or maintenance records including reports of testing as described above is subject to the satisfaction of the attending Surveyor.

21.8 Complete Surveys – General requirements

21.8.1 The requirements of 21.1 to 21.7 are to be complied with.

21.8.2 The items covered by 21.8.3 to 21.9.5 may, at the request of the Owner, be examined on a Continuous Survey basis provided the interval between examinations of each item does not exceed five years. Exceptions may be made to this requirement if Condition Based Maintenance arrangements have been agreed and maintained satisfactorily (see 21.1.9).

21.8.3 Except where alternative provisions are given below, all fuel storage tanks are to be examined externally and internally, particular attention being paid to the plating in way of supports of securing arrangements for independent tanks, pipe connections, also to sealing arrangements in way of the deck penetrations. Insulation is to be removed as required.

21.8.4 Provided that the structural examination is satisfactory, that the gas detection systems have been found to be in satisfactory condition, routine on board checks and maintenance records are satisfactory and that the voyage records have not shown any abnormal operation, fuel storage tanks will not require hydrostatic testing (except as required by 21.8.6.(d).(i)).

21.8.5 The non-destructive testing (NDT) of independent fuel storage tanks is to supplement visual inspection with particular attention to be given to the integrity of the main structural members, tank shell and highly-stressed parts, including welded connections as deemed necessary by the Surveyor. The following items are considered as highly-stressed parts:

- structure in way of tank supports and anti-rolling/anti-pitching devices,
- web frames or stiffening rings,
- swash bulkhead boundaries,
- dome and stump connections to tank shell,
- foundations for pumps, towers, ladders, etc.,
- pipe connections.

21.8.6 The NDT testing requirements for different types of independent fuel storage tanks are detailed below:

- (a) For independent fuel storage tanks of Type B, the extent of non-destructive testing is to be given in the test schedule specially prepared for the tank design. The Owner is to submit proposals for the extent of non-destructive testing of the fuel storage tanks in advance of the survey.
- (b) For vacuum-insulated independent fuel storage tanks of Type C vacuum monitoring is accepted as a demonstration of the internal integrity of the tank. This is subject to verification that the monitoring equipment is being maintained, operated and calibrated in a satisfactory condition. There is no further requirement for internal examination and testing of these tanks. The tank support arrangements are to be visually examined; non-destructive testing may be required if the condition raises doubt as to the structural integrity.
- (c) For non-vacuum insulated independent fuel storage tanks of Type C non-destructive testing is required on the plating in way of supports and also over selected lengths of welds. Where such testing raises doubt as to the structural integrity, further testing is to be carried out in accordance with the requirements of the manufacturer's test and inspection instructions for hydraulic testing (normally at 1,25 times the approved maximum vapour pressure). Alternatively, consideration will be given to pneumatic testing under special circumstances, provided full details are submitted for approval.
- (d) At each alternate Complete Survey (i.e. at 10 year intervals); non-vacuum insulated independent fuel storage tanks of Type C are to be either:
 - (i) Hydrostatically or hydro-pneumatically tested to not less than 1,25 times MARVS in accordance with the requirements of the manufacturer's test and inspection instructions. The requirements for non-destructive testing in 21.8.5 are to be carried out following this test as required by the Surveyor.

Or:

- (ii) Subject to a thorough, planned, non-destructive testing. This testing is to be carried out in accordance with a test schedule specially prepared for the tank design. If a special programme does not exist, the following should be tested:
 - structure in way of tank supports and anti-rolling/anti-pitching devices;
 - stiffening rings;
 - Y-connections between tank shell and a longitudinal bulkhead of bi-lobe tanks;
 - swash bulkhead boundaries if applicable;
 - dome and sump connections to the tank shell if applicable;
 - pipe connections.

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At least 10 per cent of the length of the welded connections in each of the above-mentioned areas is to be tested. This testing is to be carried out internally and externally as applicable. Insulation is to be removed as necessary for the required non-destructive testing.

21.8.7 Membrane fuel storage tank surveys are to be carried out in accordance with approved testing procedures provided by the containment designers.

21.8.8 Fuel storage tank pipe connections and fittings are to be examined, and all valves and cocks in direct communication with the interiors of the tanks are to be opened out for inspection and the connection pipes are to be examined internally, so far as practicable. Special attention is to be paid to the fuel storage tank master isolation valve(s); the valve seat is to be visually examined and the valve tested at the maximum working pressure of the fuel storage tank prior to re-commissioning the fuel system.

21.8.9 Relief valves are to be surveyed as follows:

- (a) The pressure relief valves for the fuel storage tanks are to be opened for examination, adjusted to the correct operating pressure as indicated in 21.8.9(b), function-tested, and sealed. If the tanks are equipped with relief valves with non-metallic membranes in the main or pilot valves, such non-metallic membranes are to be replaced. Valves may be removed from the tank for the purpose of making this adjustment under pressure of air or other suitable gas. If valves are removed, the tank and fuel piping downstream of the tank isolation valves are to be gas-freed and inerted.
- (b) Valves are to lift at a pressure not more than the percentage given below, above the maximum vapour pressure for which the tanks have been approved:
 - For 0 to 1,5 bar, 10 per cent.
 - For 1,5 to 3,0 bar, 6 per cent.
 - For pressures exceeding 3,0 bar, 3 per cent.
- (c) Where a detailed record of continuous overhaul and retesting of individually-identifiable relief valves is maintained, consideration will be given to acceptance on the basis of opening, internal examination, and testing of a representative sampling of valves, including each size and type of relief valve in use, provided there is logbook evidence that the remaining valves have been overhauled and tested since the previous Complete Survey.
- (d) Relief valves on fuel piping are to have their pressure settings checked. The valves may be removed from the piping for this purpose. At the Surveyor's discretion a sample of each size and type of valve may be opened for examination and testing.

21.8.10 All fuel pumps, booster pumps and vapour pumps are to be opened out for examination. Where applicable, pumping systems for inter-barrier spaces are to be checked and verified to be in satisfactory condition.

21.8.11 Piping for the fuel processing system including valves, actuators and compensators is to be opened for examination. Insulation may need to be removed, as deemed necessary, to ascertain the condition of the piping. If any doubt exists regarding the integrity of the piping based upon visual examination then, where deemed necessary by the Surveyor, a pressure test at 1,25 times MARVS of the piping is to be carried out. The complete piping systems are to be tested for leaks after re-assembly.

21.8.12 Equipment for the production of inert gas is to be examined and shown to be in satisfactory condition, operating within the gas specification limits. Piping, valves, etc., for the distribution of the inert gas are to be generally examined. Pressure vessels for the storage of inert gas are to be examined internally and externally and the securing arrangements are to be specially examined. Pressure relief valves are to be demonstrated to be in satisfactory condition. Liquid nitrogen storage vessels are to be examined, so far as practicable, and all control equipment, alarms and safety devices are to be verified as operational.

21.8.13 Gastight bulkhead shaft seals are to be opened out so that the sealing arrangements may be checked.

21.8.14 Any sea connections associated with the fuel handling equipment are to be opened out when the unit is in dry dock.

21.8.15 Where an approved condition-monitoring system or condition-based maintenance system is in place, the requirements for opening up of equipment may be reduced accordingly where the condition of the equipment can be shown to be within agreed acceptable limits as detailed in Pt 5, Ch 21 of the *Rules and Regulations for the Classification of Ships*.

21.8.16 Testing of the tank connection space and cofferdam leakage-detection arrangement (temperature sensors and gas detectors) is to be carried out.

21.8.17 An electrical insulation resistance test of the circuits terminating in, or passing through, hazardous areas, is to be carried out. If the unit is not in a gas-free condition, the results of previously recorded test readings may be accepted together with a review of the on-board monitoring of the earth loop impedance of relevant circuits.

21.9 Complete Surveys – Natural gas fuelled consumers and other equipment

21.9.1 Heat exchangers associated with the fuel installation are to be opened out and examined as follows:

- (a) The water end covers of evaporators are to be removed for examination of the tubes, tube plates and covers.
- (b) Heating medium pumps, including standby pump(s) which may be used on other services, are to be opened out for examination.
- (c) Where a pressure vessel is insulated, sufficient insulation is to be removed, especially in way of connections and supports, to enable the vessel's condition to be ascertained.
Note: this refers to external insulation, not additional insulation that may be installed in the annular space of a vacuum insulated tank.
- (d) Insulated piping is to have sufficient insulation removed to enable its condition to be ascertained. Vapour seals are to be

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specially examined for their condition. Vacuum-insulated piping is to be visually examined and records of maintenance and vacuum monitoring are to be reviewed.

21.9.2 The steam side of steam heaters is to be hydraulically tested to 1,5 times the design pressure.

21.9.3 Fuel pipe ducts or casings are to be generally examined and the exhaust or inerting arrangements are to be verified.

21.9.4 All alarms associated with the natural gas burning systems are to be verified; including, but not limited to, main and auxiliary engines, boilers, incinerators and gas combustion units.

21.9.5 The satisfactory condition of all pressure relief valves and/or safety discs throughout the installation is to be verified.

Part 1, Chapter 4

Verification in Accordance with National Regulations for Offshore Installations

Corrigenda

■ *Section 1* **Conditions for verification**

1.1 General requirements

1.1.4 For the assignment of a National Authority descriptive note as defined in Ch ~~2,2-8-2~~ 2.9.2, compliance with the coastal state Regulations will be considered in addition to the requirements of the Rules.

■ *Section 3* **Descriptive note**

3.1 General

3.1.1 After verification approval has been carried out in accordance with 1.1.2 to LR's satisfaction, a National Authority descriptive note will be assigned by the Classification Committee in accordance with Ch ~~2,2-8-2~~ 2.9.2.

3.1.3 When a National Authority descriptive note has been assigned in accordance with Ch ~~2,2-8-2~~ 2.9.2, an additional entry will be made on the ~~ClassDirect Live~~ Class Direct website.

■ *Section 4* **Survey requirements**

4.1 General

4.1.2 When a National Authority descriptive note has been assigned in accordance with Ch ~~2,2-8-2~~ 2.9.2, the condition of the unit, vessel or installation shall be documented by periodic surveys in accordance with the applicable coastal state Regulations.

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Guidelines for Classification using Risk Based Inspection Techniques

Effective date 1 July 2015

■ *Section 1* **Definition**

1.1 General

1.1.1 The Risk Based Inspection (hereinafter referred to as 'RBI') scheme is an alternative to the traditional periodical survey regime. It is applied by following an RBI Plan which has been approved by LR, with the purpose of detecting and monitoring system, sub-system, equipment and component degradation and applying appropriate decision criteria to manage risk to acceptable levels.

1.1.2 This chapter provides for the use of risk-based inspection techniques in the derivation of a suitable equivalent inspection regime. This should not be confused with the intent of the previous Ch 5 which is to establish arrangements enabling Classification of an asset using Risk Assessment Techniques to establish alternatives to prescriptive Rule requirements. Inspection regimes derived in accordance with the requirements of this chapter will normally satisfy those of Ch 5, Sect 5 where this is applied.

■ *Section 2* **Scope**

2.1 General

2.1.1 The RBI scheme may be applied to floating offshore installations at a fixed location.

2.1.2 The RBI scheme may be applied to the following areas of a unit:

- Hull (including internal structures, tanks, underwater aspects, appendages and openings)
- Machinery
- Turret and Moorings
- Risers
- Process Systems

2.1.3 The RBI scheme may be applied to new constructions where the RBI Plan should be developed during the design process. RBI may be applied to existing facilities where the Owner/Operator can demonstrate there is sufficient technical knowledge and unit historical data to develop an RBI Plan to meet the purpose stated in 1.1.1.

■ *Section 3* **Application**

3.1 General

3.1.1 RBI techniques may be used to provide justification for the assignment of Class. RBI techniques may be systematically applied to the whole of an installation or to individual systems, sub-systems or components.

3.1.2 Where RBI is applied to only part of an installation, the remainder of the installation is to be designed, constructed and maintained in accordance with the remaining Parts of these Rules.

3.1.3 Similarly, a unit will continue to be classed by LR, provided LR has verified that all critical elements remain in good order and condition, and continue to meet their standards in operation. Otherwise, classification will be subject to continued compliance with LR's Rules.

3.1.4 It is the responsibility of the Owner/Operator to comply with any requirements of the National Administration. Where an RBI plan differs from those required by the National Administration or IMO Conventions, it is the responsibility of the Owner/Operator to obtain the necessary acceptance of the National Administration.

3.1.5 It is the responsibility of the Owner/Operator to develop, operate and review application of the RBI Plan and the RBI Plan is then to be approved by LR. The Owner/Operator shall demonstrate that the plan is being regularly reviewed according to the review schedule and any changes to the approved inspection regime are recorded in a satisfactory manner to enable audit and continued approval of the RBI Plan.

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3.1.6 Lloyd's Register's Guidance Notes for the Risk Based Inspection of Offshore Units define acceptable RBI methodologies.

3.2 Survey using Risk Based Inspection

3.2.1 Where Classification using Risk Based Inspection techniques is proposed, surveys should meet the requirements laid out in Chapter 5, Section 4.

■ Section 4 Core Requirements

4.1 Preparation and Planning

4.1.1 The Owner/Operator is to submit the proposed RBI Plan containing details of the code/standard that they propose to apply to the unit to LR for approval. The RBI Plan shall demonstrate that the Owner/Operator has adequately considered:

- Compilation of sufficient qualitative and quantitative data to develop the RBI plan.
- Identification of critical elements
- Risk bands
- Mitigation measures
- Audit techniques
- Management structure.

4.2 Inspection and Surveys

4.2.1 The approved RBI Plan shall detail the survey regime for the specific unit in conjunction with the following surveys.

4.2.1.1 Annual Survey: Annual Surveys are to be held on all units within three months, before or after each anniversary of the completion, commissioning or Special Survey. At Annual Survey, the Surveyor is to examine the unit and machinery, by non-intrusive survey, in order to be satisfied as to their general condition.

4.2.1.2 Tanks will be credited on the basis of the approved and maintained RBI Plan which may include acceptance of tanks based on inspection of others which are agreed (with LR) as representative. The use of such "representative tanks" should be fully justified within the RBI plan:

- For tank entry, where intervals in excess of the usual Class periodic intervals are proposed the justifications with supporting reports are to be submitted for review by LR. This review will encompass, but not be limited to, coatings, environment, fatigue hot spots, design calculations and operational philosophy.
- Void spaces will be considered subject to corrosion mechanisms, unless suitably inerted and protected by a demonstrable control system. Where void spaces are demonstrably protected the RBI Plan may define a less intrusive approach. In instances where a void space undergoes a change of use the RBI Plan is to be reassessed for these spaces taking into account the change of use, this applies even where the change of use is temporary or a one off occurrence (For example a void space changing use to a sea water ballast space will then be considered a sea water ballast tank).
- For conventional oil-based hydrocarbon tanks where intervals in excess of the usual Class periodic interval are proposed the justifications backed up by the supporting reports are to be submitted for review by LR. This is to cover but not be limited to: coatings, environment, fatigue hot spots, chemical composition of hydrocarbons/cargo.
- For LNG/LPG tanks the manufacturer may propose the inspection interval for approval.

4.2.1.3 Machinery The approved RBI Plan will demonstrate the rationale proposed for machinery inspections which may include reference to manufacturer recommendations.

4.2.1.4 Offshore In Water Surveys (OIWS) In-Water surveys may be conducted by LR-Approved Service Providers and in the presence of an LR Surveyor. The Owner/Operator is to propose the In-Water inspection regime within the RBI Plan submitted to LR for approval.

4.2.1.5 Special Survey: Special Survey will be credited five yearly on the basis of the approved RBI Plan being adhered to.

4.3 Review

4.3.1 Approval for the continued application of the RBI scheme will be determined by an Annual Audit of RBI documentation and survey reports by Lloyd's Register.

Cross-References

Section numbering in brackets reflects any Section renumbering necessitated by any of the Notices that update the current version of the Rules for Offshore Units.

Part 1, Chapter 3

- 4.3.12 Reference to Part 1, Chapter 3, 9.3 now reads
Part 1, Chapter 3, 9.2.14
- 4.3.13 Reference to Part 1, Chapter 3, 9.3 now reads
Part 1, Chapter 3, 9.2.14

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